



Garden Cuttings

a monthly newsletter for the discerning gardener

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Managing Editor: TIM NORTH

Production Editor: KEVA NORTH

Editorial Office: C/o P.O. Box 279, EDGECLIFF, N.S.W. 2027 - Tel: (02) 326-1519

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Gardening is growing!

Speaking at a recent nurserymen's convention in Sydney, Mr Alan Newport, President of the N.S.W. Nurserymen's Association, quoted from a survey by the Victorian Department of Youth, Sport and Recreation, which found that among adults 28% were actively engaged in gardening, compared with 7% in sport. Gardening also came out as the number one form of recreation in Australia in a survey of leisure by the Arts Council of Australia.

Mr James Davis, Principal of Burnley Horticultural College in Victoria, in a recent article in 'Australian Horticulture' also had some interesting statistics. He says that the current growth rate of the nursery industry in Australia is around 12% per annum, but the interesting thing is that virtually all this growth is in what may be described as 'pleasure plants' together with the associated materials for their propagation, culture and use. He estimates that the turnover in amenity horticulture is now more than \$400 million per year.

This increase in the popularity of gardening as a leisure pursuit, though welcome in many respects, does create some problems. One is that there is a temptation for people with few or no qualifications, perhaps no direct interest in gardening, to jump onto the bandwagon, and start selling plants. One sees plants for sale in supermarkets, second-hand furniture shops, even in petrol service stations - surely not the most suitable outlets. Even some of the newer garden centres show signs of being better endowed with financial and promotional 'know-how' than with horticultural expertise. A great many people who buy plants know next to nothing about them, and need honest, educated advice. It seems unlikely that this will be forthcoming in a supermarket or a service station. Buying the wrong plant or a plant of inferior quality leads to disappointment and disenchantment.

On the other hand our best garden centres are very good, and there are a great many nurseries with a fine tradition of quality and service. But as demand increases these become bigger, and less personalized; economic pressures compel them to 'mass merchandise' a comparatively narrow range of plants. Faced with this sort of competition, the small nurseries run by knowledgeable, dedicated and *caring* people, with something special to offer, struggle to survive. We believe that these are the nurseries that 'discerning gardeners' will be interested in, so one of our objectives is to find them and write about them. It is with pleasure, therefore, that we include a short note on one such nursery in this issue. TIM NORTH

The Australian year of the tree

To make all Australians more aware of the value of trees the United Nations Association of Australia National Environment Committee has declared 1982 as the Australian Year of the Tree. Official celebrations will commence on World Environment Day, June 5th.

The goal is to create and co-ordinate an imaginative and festive national awareness campaign, to celebrate the tree, and to make sure that we conserve this essential natural resource.

Education of school children - with posters, project kits, competitions, ceremonial tree plantings, and workshops, is a priority. Local community groups will be encouraged to hold film nights, have tree festivals, and organize local tree planting projects. Hopefully, through liaison with federal, state and local government bodies, the need for changes in government policy will be assessed.

To achieve these aims the Committee needs substantial financial support; it needs office and secretarial help; it needs help with art and research; and above all it needs the energy and enthusiasm of a lot of people.

The Patron of the Year of the Tree will be Dr. Richard St. Barbe Baker, conservationist and forester who, sixty years ago, founded the international organization called 'Men of the Trees', of which Prince Charles is Patron. Dr. Baker has personally supervised and co-ordinated the planting of twenty-six trillion trees. Only last year he had a vision of a world wide movement of children, of all races, all classes and all creeds, joining hands to plant trees; and so 'The Children of the Green Earth' was born, a movement which has now spread to Australia; it is for children of 9 to 12 years, who write to one another and plant trees.

Anyone who can help the Year of the Tree campaign, with a donation, with secretarial help, with research, or in any other way, is invited to write to The United Nations Association of Australia, National Environment Committee, 241 Pitt Street, Sydney, 2000.

But why all this concern about trees? Our article in Vol 1, no 1, entitled 'Our Vanishing Flora' highlighted the problem on a global scale. Nearer home vast areas of eucalypt forest in Victoria, particularly in the East Gippsland area, are being cleared for pine plantations destined for wood chipping. By the end of this century these forests, as we know them, will have disappeared, along with the wildlife that inhabits them. The same thing is happening in New South Wales and in Tasmania.

The effect that this is having on our environment is discussed briefly in the article on page 27

Banking seed for the future

In the article on 'The conservation of rare and threatened plants' in our November issue we stressed the importance of maintaining the vast store of genetic material that has been accumulated over centuries of plant breeding in different environments.

One area in which this is of paramount importance is that of vegetables. In the past there has been a proliferation of vegetable varieties to meet differing local conditions and local tastes. In recent years, however, the number of varieties in cultivation has contracted sharply and many of the older ones have either disappeared or are in danger of doing so. This has been due largely to economic pressures - seed firms no longer find it economic to market large numbers of varieties of the same vegetable; it can also be attributed to the swing towards processed - that is frozen, tinned and dried - vegetables. Vegetable processors have certain special requirements, and generally find it easier to stick to one, or at the most two, varieties of each, which are then grown under contract by large scale growers.

The National Vegetable Research Station in England has now set up a vegetable gene bank. The aim is to collect up to one litre of seed of at least 9000 varieties of the more familiar vegetables and about 3000 varieties of tropical and oriental vegetables. Donations of seed are being received from many different sources from all over the world, including some from private growers. All the known characteristics of each variety are stored in a computer, so that, if a plant breeder in the future wants to track down a variety with a certain characteristic, for example resistance to a certain disease, it will be possible to tell him whether such a variety exists, and if it does, to retrieve seed from the store for him to use.

Seeds will be dried immediately they are received and placed in hermetically sealed polythene boxes. The boxes will be stored in a cold room at minus 20 degrees Celsius and at a carefully controlled humidity. Under these conditions they will last for at least 30 to 50 years, but during this period some seed will be

taken from the store and used to grow plants to produce more seed. In this way the collection can be maintained indefinitely.

Most of the initial capital for this project has been provided by OXFAM, with contributions from the Agricultural Research Council of Great Britain and from the International Board of Plant Genetic Resources. OXFAM have guaranteed to maintain it for seven years, after which the Agricultural Research Council will assume full responsibility.

Good grevilleas

Grevillea 'Robyn Gordon' is arguably the best native plant yet produced; it flowers most of the year, has beautiful foliage, has few pest or disease problems and is small enough to fit into most gardens.

There are many more useful Grevilleas though, such as G. 'Ivanhoe', an excellent privacy plant growing to 3-5m tall by about 2m wide; dense, with bronze new growth and pleasant pink/red flowers. *Grevillea X hookerana* (sold as a species but actually a hybrid) is an outstanding screen plant about 2m tall by 3-4m wide. Its foliage is a spectacular light green and the deep pink/red toothbrush flowers are superb.

Some of the newer varieties are interesting as well. G. 'Misty Pink' is similar in growth habit to *G. banksii* but it has masses of light pink brush flowers. It is recommended by the N.S.W. State Council of the Australian Institute of Horticulture.

G. 'Sandra Gordon' is a big one - to 8m or more - but it can be kept small with annual or twice yearly pruning (keep it to about 2-3m) and its yellow flowers are outstanding. It produces so much nectar that it drips from the flowers.

In the area of ground covers, Grevilleas really shine: G. 'Poorinda Royal Mantle' is a very fast grower to a diameter of 2-4m. It forms a dense mat and the flowers, a deep pink, are in an attractive toothbrush head. *G. obtusifolia* (prostrate form) is an outstanding light green groundcover also. It is hardy and very long-lived and should replace the unreliable *G. bitemata* in the future. It has red flowers but it is not a prolific flowerer - grow it more for its foliage. If you want a prickly groundcover, try *G. juniperina* 'Molonglo' an apricot/yellow hybrid of two forms of *G. juniperina*. It is hardy and free flowering.

Around the corner are some interesting new ones. Two prostrate forms of *G. banksii*, one red and the other cream flowering, will be available in a year or two. A prostrate form of *G. pteridifolia* is becoming available in small numbers now. It has fine foliage and huge orange/yellow flower heads.

Other excellent Grevilleas are:

G. 'Pink Pearl' or 'Canberra Gem' (they look the same) - excellent but prickly medium shrubs.

G. 'Boongala Spinebill' - about the same size as 'Robyn Gordon' (1.5m tall x up to 3m wide) and it flowers most of the year. It is one of the best bird-attracting varieties.

Many of the Poorinda hybrids are outstanding. Look for 'P. Elegance', 'P. Constance', 'P. Rondeau' and 'P. Peter'.

The following Grevilleas are due for a bit of a rest in Sydney. They are either poor performers, over-used, or inferior to alternatives. These are: *Grevilleas bitemata*, *X gaudichaudii*, *rosmarinifolia* and its forms, *alpina*, 'Jenkinsii' and 'White Wings'. Many of the Southern and Western species, coming from more Mediterranean climates (wet Winters and dry Summers) don't fare too well with our Summer humidity, so stay clear of them.

(contributed by Don Burke, Roseville, N.S.W.)

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Trees and the environment

One of the effects of the growing concentrations of population and the industrialization of our society is that the amount of carbon dioxide in the atmosphere also increases, while the amount of oxygen decreases. About ninety thousands billion grammes of carbon dioxide are released into the earth's atmosphere every year by the burning of coal and oil, and it has been shown that each molecule of the gas remains in the atmosphere for about four years before being absorbed into the oceans or used in other ways. Between 1900 and 1960 the carbon dioxide concentration in the atmosphere increased by about 14%.

Fortunately for us, photosynthesis of plants acts as a gigantic atmospheric ventilation system, that continually counteracts the consumption of oxygen by living things and the excess carbon dioxide they exhale. Under completely natural and stable conditions the two processes just about counteract one another. It is only when we upset the balance of nature and destroy our vegetation that we start to pollute our atmosphere.

Photosynthesis, however, does more than that. It also contributes to the ozone layer above the earth's surface which protects us from the harmful short-wavelengths of ultra violet radiation. If photosynthesis was drastically reduced there would be insufficient oxygen in the air to maintain this all important ozone layer.

Another main pollutant in industrial areas is sulphur dioxide, and here again plants come to our help by absorbing part of this. Too heavy concentrations of sulphur dioxide, however, will be harmful to plants. Generally speaking the trees that are most effective at removing pollutants from the atmosphere are those

which are most sensitive, so the problem is to find species and cultivars that will absorb appreciable amounts without showing unacceptable injury.

Japanese Privet (*Ligustrum japonicum*) has been found to be one of the most efficient and tolerant absorbers of common pollutants, while Russian research indicates that Alder, Birch, Lilac, Liquidambar and the European and North American species of Maple are efficient absorbers of sulphur dioxide. Birch, Hickory and Pin Oak are said to absorb atmospheric cadmium from motor vehicle exhaust fumes. On the other hand conifers cannot be grown in heavily industrialized areas, nor can most ericaceous species. In Northern Europe the following have been found to be relatively resistant to industrial 'smog' -

<i>Betula pendula dalecarlica</i>	<i>Catalpa bignonioides</i>
<i>Ginkgo biloba</i>	<i>Liriodendron tulipiferum</i>
<i>Malus floribunda</i>	<i>Morus nigra</i>
<i>Robinia pseudoacacia</i>	<i>Sophora japonica</i>
<i>Taxodium distichum</i>	<i>Taxus baccata fastigiata</i>

As well as helping to absorb chemical pollutants from the atmosphere and returning oxygen to it, trees reduce pollution from noise (see 'Trees and Shrubs and Noise' in Vol 1. no 2); they reduce glare caused by the sun's rays falling on flat, reflective surfaces, they play an important part in maintaining the water balance, they reduce or deflect wind velocity, and they have a definite effect on temperature. Research in the United States, for example, has shown that the discriminate planting of trees and shrubs around buildings reduces the amount of cold air reaching the walls to such an extent that there could be a reduction of up to 40% in the consumption of fuel for heating.

Trees, therefore, do far more than picturesquely fill vacant spots in our landscape.



A TREE-LINED STREET IN BOWRAL, N.S.W. - photo by Kerry Dundas

A cottage garden nursery

In these days of 'one stop' gardening supermarkets which, insofar as their plant material at least is concerned, tend to have a depressing sameness it is always a pleasure, and something of a surprise, to come across a small nursery that has old-world charm and individuality, some unusual plants to offer, and where horticultural skill still seems to count for more than 'glamour' merchandising.

Willunga Herb Nursery and Gardens, on Bong Bong Road, Moss Vale, N.S.W., is one of these. Run by two young enthusiasts, Geoff Duxfield and Chris Hurditch, this is a real cottage garden. At first sight the plants in the garden seem to be growing in cheerful disarray but when you enter the little mud brick building that serves as a showroom you will see the care, thoroughness and originality of thought that lies behind this enterprise. Here are jars of herb jellies, jams, sauces, soaps and spampoos, sachets, seeds and packets of dried herbs, books and cards, unpretentiously packaged and neatly laid out. Outside are rows of carefully labelled plants - and there are a few surprises to be found among them.

Some of the more unusual plants available are:

Angelica pachycarpa (Ornamental angelica)
Agastache foeniculum (Hyssop Anise)
Ballota nigra (Black Horehound)
Chelidonium majus (Greater Celandine)
Chrysanthemum balsamita tanacetoides (Costmary)
Cardamine pratense (Lady's Smock)
Filependula ulmaria (Meadowsweet)
Galium verum (Lady's Bedstraw)
Geranium robertianum (Herb Robert)
Isatis tintoria (Woad)
Leonorus candiacus (Motherwort)
Leonorus sibericus (Siberian Motherwort)
Ocimum Kilimandscharicum (Basil Camphor)
Ranunculus filicaria (Lesser Celandine)
Reseda luteola (Weld)
Teucrium marum (Cat Thyme)
Teucrium chamaedrys (Wall Germander)
Teucrium scorodonia (Sage-leaved Germander)
Salvia pratensis (Meadow Sage)

The address is Willunga Herbs, Bong Bong Hill, Moss Vale, N.S.W. 2577 (Telephone: (048) 91 1535). The nursery is open only at weekends and on all holidays.

Meadowsweet (*Filependula ulmaria*)

Another botanical name for this herb is 'Spiraea ulmaria', which was given to it because the fruit consists of small spiral achenes twisted together. This name is to-day associated with the word Aspirin, as salicylic acid was first derived from the flowering buds of Meadowsweet.

It is found in moist places in Europe and Asia, and is a perennial which reaches a height of up to one metre if given favourable conditions. The leaves are dark green and are comprised of serrated leaflets up to eight centimetres long. The flowers appear in midsummer and are faintly aromatic. They grow in large terminal clusters and are creamy-white in colour. The odour is somewhat like that of almonds. Another name for this plant is 'Queen of the Meadows' as it was largely used to flavour mead or honey wine.

The specific name 'ulmaria' is derived from the Latin 'ulmus', an elm tree, as the foliage of Meadowsweet resembles that of the elm. From an old author we learn that 'Queen Elizabeth of famous memory did more desire it than any other herbe to strew her chambers withall'.

The root of Meadowsweet was once valued for treating diarrhoea as it is not only astringent but also nourishes the bowels. It was also frequently used in affections of the blood and in stomach upsets. An infusion, sweetened with honey, is also a very pleasant beverage for ordinary use.

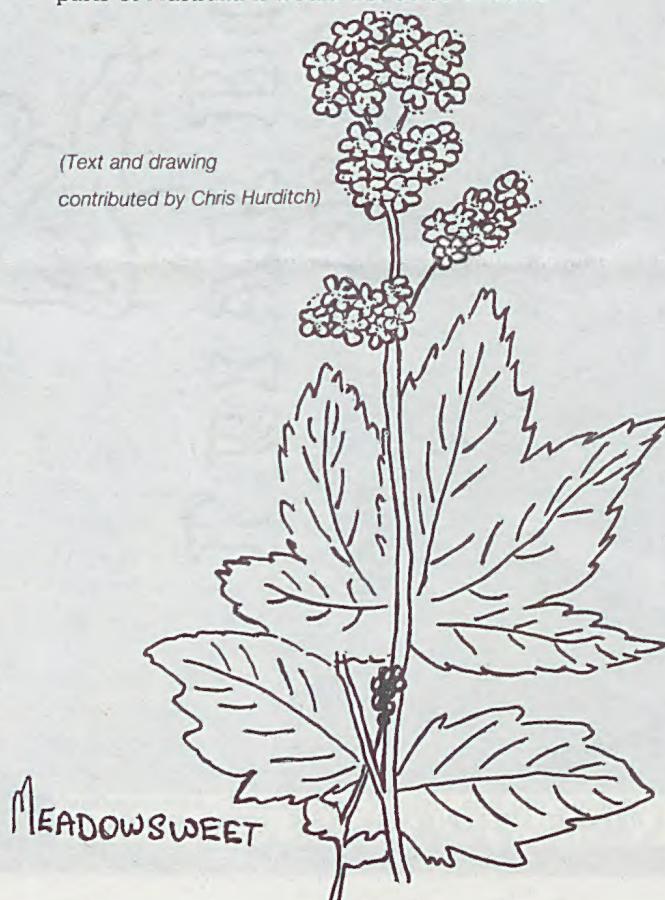
Greater celandine (*Chelidonium majus*)

The word 'Celandine' is derived from the Greek word for swallow, as this herb comes into bloom around the same time that the swallows return in the spring.

Care must be taken when handling this herb as the brilliant yellow sap is a powerful irritant. This same juice is reputed to remove warts if used regularly, and also ringworms and corns. An ointment may also be made using the roots and leaves; this has been used with success on piles, while an infusion of the herb in milk has been used as an eye-lotion to remove the white spots on the cornea.

Greater Celandine is a perennial which also self-seeds very rapidly. I found it to be quite a pest in my own garden and have spent many hours removing young seedlings. It is found close to inhabited regions in Europe, preferring cottage hedgerows and waste ground. It grows to a height of eighty centimetres, and its leaves are pinnate and covered with fine hairs. The four-petalled, yellow flowers appear in early summer and are followed by thin green seed pods. It is possible that in the warmer parts of Australia it would not be so invasive.

(Text and drawing
contributed by Chris Hurditch)



Some uncommon passion flowers

The following has been sent by Mr. C. L. Wheller, of Romsey, Victoria:

(Reprinted from The Journal of the Royal Horticultural Society, Vol. LXXXVIII, part 7, July 1963.)

During investigations into horticultural merits of many species and varieties of the genus *Passiflora* some 10 years ago, I obtained several plants which possessed flowers or fruit of potential horticultural value. Outstanding among these was a robust plant presumed to be a garden hybrid or mutation of *Passiflora caerulea*. Listed as *P. 'Empress Eugenie'* by Hazelewood's Nursery, Epping N.S.W., from whom it was obtained in the early 1950's, this variety has since established successfully in open gardens in several Melbourne suburbs. The large fragrant flowers usually 4 to 4½ inches in diameter open continuously from late November to early May, but despite hand-pollination have always failed to set fruit. Pink petals alternating with white sepals, surmounted by large purple spotted crown, topped by five large golden anthers set against a background of large, handsome three-lobed foliage make this an outstanding climber in any company.

Although similar in many respects to the common *P. caerulea* widely used in Victoria as a rootstock for *P. edulis*, 'Empress Eugenie' although a robust plant, never becomes a pest, very little suckering occurring from the roots and its top vigour being apparently checked by its long flowering season. Superficial differences between *P. caerulea* and 'Empress Eugenie' as grown in Victoria are well marked even in small plants - the former, though bearing similar broadly three-lobed foliage in the juvenile state, quickly produces its typical adult foliage of five narrow lobes. The thinner, more wiry stems, slightly smaller white-petalled flowers of *P. caerulea* lack perfume and are usually followed by soft-shelled orange-coloured fruit. This plant being of more rampant habit also suckers more readily and is held in little esteem as an ornamental in Australia.

A colour print received from U.S.A. some years ago labelled '*P. pfordtii* (syn. *alato-caerulea*)' depicts a plant apparently identical with *P. 'Empress Eugenie'*. In an abstract of EDWIN CHEEL's Notes on Passion Fruits printed in the N.S.W. Dept. of Agriculture Journal, June 1, 1928, mention is made of the species *P. alata* being introduced to England in 1772 by Mr. W. MALCOLM who grew it in his garden at Kennington and had a coloured drawing published in the Botanical Magazine in 1788. In an article published in a Victorian magazine in recent years regarding the gardens at Balmoral Castle, mention was made of the 'fragrant passion flower' growing there.

Whilst it is possible that there is no connection between our 'Empress Eugenie' and any of the foregoing species or varieties (or cultivars), it would appear reasonable to assume that some hybridization occurred at one time between *P. caerulea* and *P. alata* - probably in North America or Western Europe and that *P. 'Empress Eugenie'* and *P. pfordtii* are both the result of crossing *P. caerulea* with another species.

As no material of *P. pfordtii* appears to be available in Australia for comparison, and no information on the origin of 'Empress Eugenie' can be obtained here, the writer would be pleased to receive any further information from any source.

C. L. WHELLER, Tullamarine, Victoria, Australia.

Following the publication of the above, Mr Wheller received these replies:

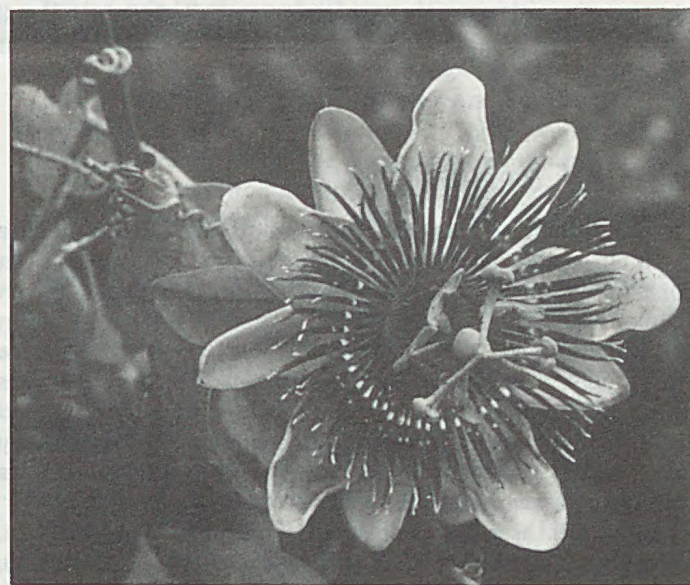
"With reference to your note in the R.H.S. Journal for July 1963 about the *Passiflora 'Empress Eugenie'* I have come upon the following from the 'Floral World and Garden Guide' of June 1874. It occurs in an article on Passion Flowers by the nurseryman George Gordon: '*Passiflora 'Imperatrice Eugenie'*, a very beautiful hybrid especially adapted for planting in conservatories frequently illuminated with gas, as burnt air does not injure it in any appreciable degree. It is also capable of resisting the deleterious effects of smoke and dust and is, therefore, better suited for conservatories in town than any of the others'. The French title rather suggests that it was originally raised in France sometime during the Second Empire. Whether the parentage was recorded or whether it was a chance seeding I can see no way of finding out. The article does not mention *P. alata* but does mention that there was another article in the same journal in October 1868. Unfortunately I do not own this so I do not know."

(Sgd) Richard Gorer, Hoods Place, Kingston, Canterbury, Kent 9/11/63.

"I have just read your note on *P. 'Empress Eugenie'* in July R.H.S. Journal... I also obtained from a friend a plant labelled *P. alata* grown from seed from Brazil. This flowered after a few years and was a beautiful blood red flower with a most unusual form. I could not set seed on this by selfing but finally got a large yellow fruit from pollen of *P. caerulea*. From this I raised a plant which to me seems identical to the original 'Empress Eugenie'. It is exceptionally vigorous and has now spread over a very large bush house and flowers are produced in profusion and it appears to be quite sterile"

(Sgd) W. Morris, 89 Mills St. Warner's Bay, N.S.W. 30/9/63

Mr Wheller was proprietor of the Tullamarine Plant Farm for many years until, as he puts it, he "was planned out of existence by the Melbourne and Metropolitan Board of Works." He now grows Australian and some uncommon exotic plants in his garden at Romsey. In addition to *P. Empress Eugenie'* he has recently raised several *P. incarnata* from U.S.A. seed. Although he is not now engaged in commercial horticulture he states that he may be able to supply small quantities of cuttings of 'Empress Eugenie' as well as seeds or cuttings of a few uncommon exotics, preferably on an exchange basis. His address is corner of Metcalfe Road and Todd Lane, Romsey, Vic. 3434.



PASSIFLORA 'EMPRESS EUGENIE'

GARDEN GEAR

New spraying equipment

The Hudson cordless electric sprayer uses a rechargeable nickel-cadmium battery as its power source. The extension to the spray nozzle can be set at any angle, including one which conveniently sprays the undersides of leaves, while the nozzle itself adjusts to any cone spray pattern. The polyethylene container holds 2¼ litres of spray mixture, and up to three containers full can be delivered before the battery needs recharging - this can be done overnight. This sprayer is available from most nurseries and hardware stores and costs about \$30.

For those with very large gardens, as well as professional gardeners and nurserymen, the Silvan Handi garden sprayer is a useful piece of equipment. This totally self-contained sprayer features a 20 litre polythene container, battery and pump, all mounted on a small trolley for easy transportation. Also included is hose, spray lance, nozzles and battery charger. The diaphragm pump is driven by a 12 volt wet cell battery, and is available in 50 p.s.i. and 100 p.s.i. sizes. The 50 p.s.i. size costs \$350 and the 100 p.s.i. size \$450. Further information can be obtained from Silvan Pumps and Sprayers (Aust) Pty. Ltd. 2-4 Douglas Street, South Melbourne, Victoria, 3205: Silvan Pumps and Sprayers (NSW), 36 Stoddard Road, Prospect, N.S.W. 2149: or Silvan Marino Pumps and Sprayers, 52 Wecker Road, Mt. Gravatt, Queensland, 4122.

Mulching with clear plastic film

Clear plastic film applied tightly to the soil in early spring warms it rapidly as well as suppressing weed growth. The University of Wisconsin Experimental Farm reports that it can increase yields of vegetables considerably, probably because the warming accelerates the decomposition of organic matter. Research in Israel shows that a clear plastic mulch on moist soil for six weeks in summer not only eliminates many plant diseases, but also results in a considerable increase in nitrate nitrogen, calcium, magnesium and potassium, as well as improving soil structure. Growth increases of up to 50% occurred in subsequent plantings.

Liquid Seaweed

As a fertilizer fresh seaweed is roughly equivalent to cow manure in its nitrogen content, contains about twice as much potash, but only about one third as much phosphorus. Foliar feeding with liquid seaweed, however, has produced dramatic results in growth and yields, as well as considerably increasing resistance to drought, frost, disease and insect infestation. These results have been even greater when the seaweed was supplemented with an amino-acid/enzyme/polysaccharid product. Apparently this product provides enzymes and possibly other substances missing in seaweed or lost during processing.

'Maxicrop' is a liquid seaweed fertilizer of English origin, distributed in Australia by R.A. Bell-Booth & Co., (Aust.) Pty. Ltd., 375 Bayswater Road, Melbourne, Victoria. 'Seasol' is a wholly Australian product manufactured by Tasbond Pty. Ltd., 330 Invermay Road, Launceston, Tasmania.

Getting rid of waste

Millions of dollars are about to be spent on pumping Sydney's excrement into the Pacific Ocean - hopefully in such a fashion that it won't find its way back onto our beaches. Ratepayers won't need to be reminded of the amount they are required to pay every year for the removal of their household waste. And where does it go? That alone is now a major problem in every large city.

Are we, in fact, lagging behind other countries in ways of disposing of waste?

Sewage sludge has been recognized for decades as a useful soil conditioner, though it may not always be available in a form that is easy, or economical, to apply. Dried sewage sludge contains more organic matter than animal manure, though not necessarily in such a readily adaptable form, about twice as much nitrogen, three times as much phosphorus, but only about half as much potash. It can be regarded as a useful source of slow release nitrogen and phosphorus, but needing a supplement of potash. In 1957 it was estimated in the United Kingdom that 350,000 tons per year of sewage sludge were being used by market gardeners and farmers.

The real answer lies in composting wastes. Composted waste contains more nitrogen and potash than the original sludge and is in better physical condition for handling. It could be a valuable additive for poor sandy soils.

Some interesting examples of what is being done around the world in re-cycling waste come from the United States and Canada. Milwaukee has 'Milorganite', Vancouver has 'Grow Rich', Schenectady has 'Orgro', Boston has 'Metroloam'; all these are simply bagged composted sewage sludge. A pilot project in Lukkin, in Texas, involves using earthworms to convert municipal waste into compost. Liquid or thickened sludge is applied to 'worm beds' to produce compost. This, according to the Environmental Protection Agency of the U.S., is a particularly valuable process for small cities, which do not have the same problems of heavy metal pollution that more industrialised cities have. A report on this process, entitled 'An Engineering Assessment of Vermicomposting Municipal Wastewater Sludge' is available from the Environmental Protection Agency, Cincinnati, OH 45268.

Another report comes from Seattle, which has started a re-cycling and energy recovery system. The City Council is studying a proposal to compost all garden - and eventually food - waste. Both domestic backyard composting and 'neighbourhood composting' are being stressed, and municipal collection and composting, with a view to producing a saleable product, is also being considered. It is estimated that this plan, when fully implemented, would reduce the load on municipal waste collection and disposal facilities by 20% or more. A sixty page report 'Proposed Composting Strategy for the City of Seattle' has been produced.

Sewage sludge may yet become a widely used soil additive for gardens and farms, and could become a partial substitute for, or at least a supplement to, petroleum based fertilizers. Now that governments are spending almost as much on sewage treatment and waste disposal than they are on schools, the idea of selling waste rather than just disposing of it clearly has some attraction. The problem of toxic heavy metals, particularly cadmium and lead, in industrial waste, however, still has to be resolved. Experiments have shown that cadmium does not leach out of soils, and that leaf vegetables take up more cadmium than grains, fruits or tubers.

Growth regulators

The discovery of growth regulator substances in plants goes back more than fifty years. The first one isolated was indoleacetic acid, which became known as an auxin. Since then scientists have discovered that many growth processes, like root initiation, induction, and release of dormancy in seeds and buds, initiation of flower buds, senescence and abscission, as well as the rate of growth, are controlled by minute amounts of various substances that are produced in different plant organs and released in different parts of the plant.

Many of these substances have been synthesized and are used either on their own or in conjunction with endogenous plant growth regulators. Many of these synthetic materials, in fact, act by suppressing the reactions controlled by the endogenous substances, by blocking or accelerating their biosynthesis. These synthetic materials can be divided into three groups:

1. Natural plant growth regulators produced by chemical synthesis, like ABA, IAA, and various gibberellins.
2. Synthetic growth regulators, like IAB, NAA, TIBA, cytokinin-like compounds, kinetin and ethep.
3. Other chemicals which have diverse growth-regulating activities.

The most important plant growth regulators from the practical gardening point of view are those which inhibit stem elongation and increase the number of flowers, by promoting the development of lateral buds. In normally grown plants the development of lateral buds and branching is suppressed by auxins; cytokinins, which are produced in the roots, promote branching. Thus a temporary disturbance of the auxin/cytokinin balance makes possible the direction of the plant's growth into a desired shape. One of the materials used for this purpose is Atrinal (chemically dikegulac sodium). Described as a 'chemical pincher' Atrinal is being used extensively by commercial growers, and to a lesser extent by keen amateur growers in the U.S.A. to promote a bushy growth habit and the development of lateral buds on azaleas and other ornamentals. In Australia it is at present available only to commercial growers. A very similar material is now being marketed by I.C.I. in England under the name 'Cutless'; when used on hedging plants it is claimed that it is necessary to cut the hedge only once a year, because strong outward growth is discouraged, and a thicker, bushier habit encouraged. Experimental work is still being done on a synthetic material that can be used on lawns to reduce the need for mowing. Another possible use for synthetic materials of this nature is to retard the growth of over invasive ground cover plants, such as vinca, ivies, and gazanias.

Inter-relations between various growth regulator substances seem to be responsible for flower bud initiation. Some of the most impressive results in this direction so far have been obtained by using ethep on pineapples and other bromeliads.

The gibberellins are an important group of plant growth regulators, of which about forty have been isolated. Gibberellins have been used with spectacular results on dormant camellia buds to produce earlier and larger flowers. They have also been used to produce seedless grapes, to hasten flowering in azaleas, cyclamen and geraniums, to break dormancy in, and thereby induce earlier flowering, in hyacinths, iris, tulips and lilies. They can also break the 'vernalization' - that is the need for a period of low temperatures - in raspberries, thus enabling them to be grown under a wider range of climatic conditions, with earlier cropping. It is believed that seaweed may contain gibberellins, which may be one reason why seaweed fertilizers seem to promote flowering.

Growth regulator substances are also being used to hasten the germination of seeds, and in cut flower preservatives.

In the United States the use of growth regulators and similar substances is being promoted amongst home gardeners with predictable results. More than a hundred such products are on the market already, described by such names as 'biological boosters', 'microbial fertilizers' and 'soil/seed/root inoculants'. Claims like 'these represent the greatest breakthrough since the discovery of chemical fertilizers' are being made. Some of these substances may well have great potential: others may be more or less useless.

On what sounds like a fantasy level, Denis Carlson of the University of Minnesota says he has produced an African Violet with four hundred blooms and a passion vine which grew to a length of a thousand feet, by using gibberellins plus high-frequency sound.

We can certainly expect growth regulators to play an increasingly important part in practical horticulture in the coming years, but in the meantime their use in this country, among home gardeners at least, is limited to one or two products. Perhaps the most widely used of these, and one that is generally available from retail outlets, is Hormone 20. This is a combination of two quite common auxins, naphthalene acetic acid (NAA) and indolebutyric acid (IBA). It can be used both as a root growth stimulant on cuttings, and also when planting or transplanting shrubs and trees.

A nineteenth century heritage rose garden

In Vol 1, no 1, we published a short account of a nineteenth century heritage rose garden being established in Pinjarra, Western Australia.

We have now been told that the site for this garden, for various reasons, has had to be changed, so the original concept, which included a pond and bridge, has had to be changed slightly. The new site, however, covering about 1½ acres, is considerably larger than the original one. On this site stand Pinjarra's original schoolhouse and the schoolmaster's cottage, both built in 1896 and which are to be restored.

It is intended that, as well as being of interest to rose lovers and a tourist attraction, this Rose Garden will provide facilities for instruction in the cultivation and propagation of old roses.

145 roses have so far been planted and a further 164 are being held elsewhere in readiness for the 1982 planting season. The Rose Garden Committee is appealing for donations of old roses, that is any introduced prior to 1930, and especially any raised by the late Alistair Clark, as it is hoped to plant an Alistair Clark Memorial Bed.

Anyone who may wish to donate roses to this project is invited to write to the Chairman of the Committee, Major N.W. Frost, P.O. Box 112, Pinjarra, W.A. 6208. The Committee will gladly pay all freight charges.

Quick tips

Seeds sown or seedlings planted in holes in black polythene, with a bottomless paraffin-coated milk shake cup set around each one will be protected from cold drying winds. Also the milk shake container acts as a 'chimney' which draws up the heat which builds up under the polythene. Being top-less they need no ventilation and can be left to rot.

(from the Coastal Experiment Station of Clemson University, USA)

Aleurites

One of the most beautiful of all small deciduous trees for warm temperature to sub-tropical gardens is *Aleurites fordii*, the Tung Oil or Chinese Wood Oil Tree. It grows to a height of five or six metres, and the flowers, which are a beautiful soft apricot pink in colour and carried in large, rather loose sprays, appear in spring - before the leaves are formed. They are followed by large thick-shelled nuts; the leaves are pale green and heart shaped.

The oil, which is extracted from the nuts, is used in quick drying varnishes and for waterproofing. It is said that the Chinese one used it as a constipation cure.

A. moluccana, the Candle-nut or Varnish tree, is another attractive species, a little larger with white flowers and leaves that are slightly hairy and which from a distance appear to be silvery. It can be seen growing on the shores of Lake Barrine, on the Atherton Tablelands.

A. fordii will grow quite happily as far south as Sydney. It is, however, uncommon, although it self-seeds very readily.

News briefs

Referring to the article on 'New Horizons in Pest Control' in Vol 1, no 1, it is interesting to learn that research on mealybug control at Wye College in England (an extension of the University of London) is concentrating on an Australian ladybird predator, which so far has given good results.

Seventeen million pounds of rainbow trout manure from trout farms in southern Idaho were being flushed into the rivers every year, until the Environmental Protection Agency put a stop to it. It is now being sold as fertilizer.

In our November issue we mentioned that Glyphosate (Zero Weedspray and Roundup) was being marketed in the United Kingdom in the form of a brush-on gel. CIBA-Geigy Australia Ltd. inform us that they will be marketing this product in Australia during 1982.

A new systemic fungicide

When plants die, quite suddenly and for no apparent reason, the trouble in very many cases is soil-borne disease. Phytophthora and Pythium are two types of fungi which attack the roots of plants, causing the death of the plant almost before any symptoms are noticeable.

These fungi can be introduced into a garden by planting infected plants, by using infected soil or compost, or by their movement through the soil from surrounding areas . . . They thrive particularly in moist warm conditions.

CIBA - Geigy Australia Ltd., have introduced a new systemic fungicide, called FONGARID, which controls root rots, collar-rot and damping-off disease of seedlings. Being systemic in its action it controls the disease from within the plant, but can be either incorporated into the soil before planting or applied as a drench at the time of planting. It will give up to twelve weeks protection from soil-borne disease attack, depending on the rate used and soil type. It breaks down in the soil, so does not harm beneficial soil insects or useful bacteria.

FONGARID also controls Downy Mildew in roses and seedlings. Seedlings can be protected by lightly spraying them on planting - once the mildew attacks them it is hard to control. Roses, on the other hand, should be sprayed once the disease is noticed.

FONGARID is packed in handy 2 gram sachets (for most purposes one sachet is dissolved in 2 litres of water) . . . a packet contains five sachets, that is 10 grams of fungicide.



From
Jim and Keva
North

Garden cuttings

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